REMARKS

Claims 1-23 are pending. Claim 24 has been added. Claims 1-2 and 4-23 are rejected. Claim 3 is objected to. Claims 1-23 remain in the case for reconsideration. Reconsideration is requested. No new subject matter has been added.

Allowable Subject Matter

Claim 3 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 3 has been rewritten in independent form and is therefore now in condition for allowance.

Claim Rejections – 35 U.S.C. § 112

Claims 8, 9, 16-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims have been amended to overcome the rejections under 35 U.S.C. 112.

Claim Rejections – 35 U.S.C. § 102

Claims 1, 2, 5-9, 16-18, 20, 21, and 23 are rejected under 35 U.S.C. 102(e) as being anticipated by Suzuki (US 6,256,343).

Claim Rejections – 35 U.S.C. § 103

Claims 10-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki ('343).

Claims 4, 12-14, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki and further in view of Suzuki et al. (US 6,205,178).

Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki ('343) and further in view of Eleftheriadis et al. (US 6,055,330).

The Examiner states that Suzuki discloses deriving local motion vectors from the global motion parameters for individual macroblocks in the current image frame and uses the local motion vectors to identify reference blocks in a reference frame.

The rejection is respectfully traversed, however, claim 1 has been amended to further clarify the patentable subject matter of the invention.

The Examiner should note that one aspect of the present invention is to improve encoding and decoding of global motion vectors and local motion vectors and the associated data. Conversely, Suzuki only discusses a technique for generating the global motion vectors and local motion vectors. There is no discussion on how to encode the already derived global and local motion image data. For example, FIGS. 1, 4 and 7 in Suzuki show a coder 8 that supposedly encodes the global and local motion vectors but gives no details about how the global and local motion vectors are encoded.

Claim 1 specifies providing an encoded macroblock bit stream that includes global motion vectors associated with a current image frame and deriving local motion vectors from the global motion vectors in the encoded macroblock bit stream. This is clearly shown and described in the specification with regard to FIGS. 3-8 of the application.

There is no suggestion in Suzuki of deriving local vectors from the global vectors generated in an encoded bit stream. In fact, FIG. 6 of Suzuki shows that the global motion vectors mv2 are not used in generating the local motion vectors generated from the inter local motion estimation device 30-3.

Further, there is no suggestion in Suzuki of generating the local motion vectors from the global motion vectors and then decoding the macroblock from the local motion vector locations in the reference frame without first modifying the reference frame with the global motion vectors as specified in claim 1. This is also clearly described in the specification with regard to FIGS. 3-8 of the application.

As described in the specification of the present application:
"These GMC techniques have shown their advantages in low-bit-rate video coding by reducing the bit rate and enhancing the visual quality. However, GMC increases computational complexity. For each current image frame 12, the reference image 14 has to be reconstructed or updated in both the encoder and decoder based on the global motion vector 16. This can be especially expensive on the decoder side in terms of computation and memory space." (Page 1 , lines 19-page 2, line 2).

One aspect of the present invention as specified in claim 10 reduces these computations by not reconstructing and updating the reference image with the global motion vectors. This is not suggested in Suzuki or any of the other cited prior art. In fact Suzuki teaches away from this limitation by stating that the local motion compensation is performed using the global motion compensated picture as a reference picture. See FIG. 6 where the reference picture S9 is compensated by the global motion compensation device 30-2.

Claims 7, 10, and 16 describe another aspect of the invention where local vectors are not sent along with the global motion vectors for the macroblocks that use the global motion vectors to generate local motion vectors. This again is clearly shown in FIGS. 3-8.

As mentioned in the specification:

"In other situations, an object may change position from the previous image 18 to the current image 12. A local motion vector 26 identifies where the image information in macroblock 20 has moved from the previous image frame 18. The only information that has to be encoded for macroblock 20 is the local motion vector 26 and any residual differences between the image information in macroblock 20 and the image information in macroblock 28. This local motion vector video coding technique is less computationally complex than GMC but typically requires more bits since the local motion vectors 26 have to be separately encoded and then transmitted or stored for each macroblock 20 in image 12." (Page 2, line 3).

The aspect of the invention specified in claims 7, 10 and 16 eliminates having to send local motion vectors for each macroblock. This reduces bandwidth and storage requirements.

None of the prior art cited by the Examiner suggests not sending local motion vectors for selected macroblocks and then generating local vectors for those macroblock from the global motion vectors in the encoded bit stream as specified in claims 7, 10, and 16. For example, Suzuki teaches away from this limitation by stating that a local motion vector mv is generated for each macroblock and then output to the coder 8. (col. 5, line 4). "[For every macroblock . . the local motion vector mv are coded and multiplexed." (Col. 6, line 35-40).

CONCLUSION

For the foregoing reasons, reconsideration and allowance of claims 1-23 of the application as amended is solicited. The Examiner is encouraged to telephone the undersigned at (503) 222-3613 if it appears that an interview would be helpful in advancing the case.

Respectfully submitted,

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